**Royal Academies**

-English Royal Society

-Charter from Charles in 1662

-Rose from informal meetings in London and Oxford in 1640’s

-Left to own devices by government

-Investigated technological improvements for industry

-“Philosophical Transactions”-published papers and correspondence

-French Royal Academy of Science

-Recognized by Louis XIV in 1666

-Members appointed and paid salaries by French government

-Collected tools and machines

-“Journal des Savants”-experimental knowledge

-Both French and English…

-focused on practical research

-later focused on theory of mechanics and astronomy

-constructed observatories, Paris 1667, Greenwich 1675

-German cities later followed the lead of the French and English setting up science academies in their respective cities and states.

**Scientific Method:**

* The establishment of the proper means to examine and understand the physical realm
* Developing the scientific method was crucial to the evolution of science in the modern world

Francis Bacon:

* Englishman
* He made an impression on the Royal Society in England
* He was a lawyer and lord chancellor
* Rejected Copernicus and Kepler, misunderstood Galileo
* Believed people needed a stronger foundation for exploring the natural world
* Scientific Method based on inductive principles
* Wanted to use scientific discoveries for practical purposes
* Empiricism

**Physiology**

-Andreas Vesalius

-Dissected humans to understand anatomy

-Found that blood vessels originated at heart, not the liver

-Incorrectly believed that veins and arteries had different types of blood

-William Harvey

-Found that heart was beginning of circulatory system

-Stated same type of blood is circulated in veins and arteries

-Blood makes complete circuit through body

**Chemistry**

Paracelsus: Deemed father of modern medicine

* Rejected work of Aristotle and Galen
* Created new chemical philosophy: Macrocosm-Microcosm Analogy
* Every human being was a small replica of larger world
* Disease not caused by imbalance of 4 humors, rather imbalance of chemicals in the body
* Distinguished “likes cure likes” – what causes a disease will cure it (frequently successful)

Robert Boyle: Chemistry not formally recognized as a science until Boyle’s experiments

* Boyle’s Law: Volume of a gas changes with pressure
* Atoms composed of “elements” which differ, not all the same

Antoine Lavoisier: Father of modern chemistry

* Created method for organizing elements still used today

**Astronomy**

-Nicolaus Copernicus

-Heliocentric theory

-Earth’s daily rotation and annual revolution

-Disagreed with Ptolemy’s geocentric theory

-Tycho Brahe

-Rejected Ptolemy’s theory

-Couldn’t confirm Copernicus’ theory

-Appointed imperial mathematician to Emperor Rudolf II

-Johannes Kepler

-Succeeded Brahe as imperial mathematician

-THREE LAWS:

1) Planet’s orbits around sun are elliptical, not circular

2) Planet’s speed is greater when it’s closer to the sun

3) Planet’s period of revolution squared is proportional to the cube of its average distance from the sun

-Galileo Galilei

-First astronomer to use telescope

-Discovered the moon has craters, four moons revolve around Jupiter, and sunspots

-Faced punishment by Catholic church via the Inquisition

**Physics**

Descartes:

* Emphasized deduction and mathematical logic
* *Discourse on Method*
* Rationalism

Newton’s Contributions to Scientific Method:

* Invented the calculus, a mathematical means of calculating rates of change
* *Principia* in 1686
* President of the Royal Society in 1703

Newton’s Contributions to Physics:

* Universal Law of Gravitation
* Newton’s 3 Laws

**Optics**: Branch of physics pertaining to behavior and properties of light.

* Telescopes and Microscopes are related to optics
* Newton creates first reflection telescope in 1668
* Galileo uses telescope to make discoveries and therefore write *The Starry Messenger*